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Control Theory in Brazilian Organizations

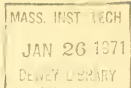
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George F. Farris and D. Anthony Butterfield ¹

Working Paper No. 583-72

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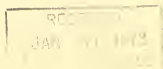
Control Theory in Brazilian Organizations

George F. ^{Farrington}Farris and D. Anthony Butterfield ¹²²⁰⁰⁷¹

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Abstract

The distribution of control was examined in 16 Brazilian development banks using Tannenbaum's (1968) "control graph" model. Contrary to the hypothesis of the "authoritarian Latin American" organization, control in these organizations was distributed quite evenly among hierarchical levels. Total control, control by upper hierarchical levels, and control by the national bank in the state-federal system were all associated with bank effectiveness. Bank effectiveness was especially associated with each level's control in the phase of project decision making for which it was most responsible. A "competence" hypothesis viewing effective development banks as "technocracies" was suggested to explain these findings.

An important aspect of all social organizations is the coordination of member behavior through a pattern of authority relations. "Control" has been defined by Tannenbaum (1968, p. 5) as "...any process in which a group of persons or organization of persons determines, that is intentionally affects, the behavior of another person, group, or organization." Control in an organization may vary in two important characteristics: total amount of control in the organization, and distribution of control among members at various levels in the organization's hierarchy. In an organization with a high amount of total control, members engage in more frequent attempts to influence behavior than do members of an organization with a low amount of control. In an organization with a relatively equal distribution of control, members at all levels have about the same effect on behavior; in an organization with a relatively unequal distribution of control, members at certain hierarchical levels affect behavior more than do members at other levels. "Democratic" organizations are often said to be characterized by a relatively equal distribution of control among hierarchical levels, while "authoritarian" organizations are often said to be characterized by unequal distributions of control, with greatest control occurring at upper levels of the hierarchy.

Tannenbaum (1968) and his colleagues have conducted a series of studies of control in organizations utilizing the "control graph". In these studies, members of an organization report on a Likert-type questionnaire item, how much influence they perceive people at different hierarchical levels have on what goes on in their organization. Member's perceptions of the amount of

control at each level are then averaged, and a "control graph" is constructed to show the amount of control exerted at each level in the organization.

Using control graphs, Tannenbaum has investigated two broad hypotheses:

- 1) The greater the total control in an organization, the more effective the organization will be, and
- 2) The more evenly control is distributed in an organization, the more effective the organization will be.

In several hundred organizational units, the first hypothesis has received considerable support, while the second has not.

As with most empirical research on organizations, Tannenbaum's work was based chiefly on organizations situated in the United States. Currently, however, he is directing a program of research on organizations in other countries. In one country where a body of research on control is emerging--Yugoslavia -- , the findings regarding total control and effectiveness are consistent with Tannenbaum's first hypothesis (see Kavcic, Rus, & Tannenbaum, 1971; and Mozina, Jerovsek, Tannenbaum, & Likert, 1970). Moreover, consistent with the egalitarian philosophy underlying the Yugoslavian workers' councils, control was found to be distributed relatively equally (see also Zupanov & Tannenbaum, 1968).

In the present study the distribution of control is investigated in 16 Brazilian financial institutions. These banks serve as agents in a national "network" of financial institutions in Brazil which makes loans to small and medium-sized enterprises. Nearly all the banks are associated with their state governments. At the apex of the system is the national development bank, which repasses money to the state and regional banks, which, in turn, loan money to borrower firms for development projects. Applications for loans from potential borrowers are reviewed at both the regional bank and the

national bank to assess the technical quality of the proposed project, qualities of the firm, and contribution of the project to economic development. The completeness of the review at the national bank depends on the size of the proposed project. This program of development loans constitutes only a portion -- albeit a significant one in most cases -- of the total business of the national bank and the regional banks.

These characteristics of the financial institutions allowed us to extend control graph theory to explore two areas not yet subjected to empirical investigation, even in the United States: the distribution of control at various stages in the process of making decisions on loan applications, and the amount of control exerted by a federal-government institution in a program involving state governments. More specifically, we explored three areas of interest:

1. Control graphs of Brazilian organizations.
 - a. How do the control graphs of these Brazilian financial institutions compare with those of various organizations in the United States and Yugoslavia?
 - b. How does total control relate to the effectiveness of these Brazilian financial institutions?
 - c. How does the distribution of control among various levels in the organizations relate to organizational effectiveness?
2. How does control by various hierarchical levels in the regional banks relate to bank effectiveness when control is considered separately for three phases of the process of decision making on loan applications:
 - a. Determining methods of analysis and control of projects?
 - b. Evaluating projects?
 - c. Approving projects?
3. How does control by the federal-government bank in the federal-state loan program relate to the effectiveness of the state banks?

METHOD

Participants in the study were 25 presidents and directors, 51 department chiefs, 43 technical supervisors, and 156 technical personnel from 16 banks. Most participants were university graduates, with degrees in law, economics, engineering, or accounting. All were involved in the development loan program. The number of technical personnel who participated in the study from each bank ranged from 3 to 25, with a median of 8. Data from department heads and technical supervisors were combined when they were found to be quite similar. For these middle managers, the median number per bank was 5.5, with a range from 3 to 11.

Control was measured, following Tannenbaum (1968), by asking participants:

How much influence do the groups, persons, and institutions listed below have in the functioning of your institution as an agent of (name of loan program)?

Six parties were listed: a) the national bank, b) the top management of your institution (president and directors), c) department chiefs, d) technical supervisors, e) technical personnel, and f) you yourself. Participants were asked to check one point for each party on a five-point scale ranging from "little or no" influence to "very great" influence.

Following an identical format, participants were also asked how much influence each group:

- ought to have
- had in determining methods of analysis and control of projects
- had in evaluation of projects
- had in approval of projects.

The relatively small number of participants from each bank was cause for

concern that our measurements of control in this study might be more associated with the individuals who reported on control than with the banks on which they reported.

Tannenbaum (1968, p. 24) points out that "To the extent that errors of measurement are not random" [i. e., are associated with the individual participants more than with the organization they are describing], "we are probably moving from a measure of organizational control to a measure of perceived organizational control."

Analyses of variance were carried out with the measures of control. They indicated substantial differences in the amounts of control reported by participants from different hierarchical levels (see below). Therefore, data from different levels in the same bank were not combined to produce measures of control for each organization.

Examining the data from technical personnel only, the variance between banks was greater than the variance within banks for 21 of 25 (parts a - e of the five control questions) measures of control, including 9 significant at the .05 level of confidence. Of the five measures of control referring to "you, yourself," which would be expected to be most associated with the individual participants, three showed greater differences within banks than between them, and the F-ratios in the other two cases were only 1.1. Thus, despite the small number of participants from each bank, our measures of organizational control were generally more associated with the organization described than with the individual participants.

Bank effectiveness was measured by asking four experts from the National Bank to rank order those banks with which they were familiar on "overall effectiveness as a development bank." (See Beals, 1970, and Farris & Butterfield, 1971, for details.) Median intercorrelation among the judges was 0.77, indicating satisfactory inter-rater agreement. Rank-order correlations be-

tween this ranking of overall effectiveness and several other possible indicators of bank performance are shown in Table 1. Correlations are all positive, but low enough to indicate that bank effectiveness is not a unitary concept. (Intercorrelations among these other indicators of effectiveness were of similar magnitude. Control generally related to these other indicators of effectiveness in a manner quite consistent with the ways in which it related to the ranking on overall effectiveness.)

RESULTS

Control graphs of Brazilian organizations

Figure 1 shows the actual and ideal distributions of control for all 16 financial institutions. It is based on the average scores of the 275 participants in response to the questions about how much influence each party has and ought to have in bank operations as an agent of the loan program. In general, each hierarchical level within the banks was seen as exerting "considerable" to "great" influence, with top management and department heads having slightly more influence than technical supervisors and technical personnel. The curve of the "ideal" distribution of control was roughly parallel to the curve of "actual" control, and almost half a point higher on the five-point scale. Participants think there should be more control than there is. These results are quite consistent with those reported for several U. S. organizations in Tannenbaum (1968).

If one were to predict the slope of the control graph for these Brazilian organizations, he would be likely to expect to find a steeply sloped control curve, with upper hierarchical levels having substantially more control than lower levels. Informed observations of other aspects of Brazilian society suggest such a prediction. (See, for example, Skidmore, 1967, pp. 318-319, on the Brazilian political system; Lauterbach, 1966, pp. 8-9, on industrial organizations; or Freyre, 1938, and Smith, 1963 on the patriarchal Bra-

zilian family).

The curves of actual and ideal control in Figure 1, however, are contrary to the notion of an authoritarian distribution of control in these government organizations. The slopes of both curves are quite flat. In fact, both the actual and ideal control graphs are more similar in slope to those of Yugoslav organizations, with their egalitarian workers' councils (see Kavcic, Rus, & Tannenbaum, 1971, and Zupanov & Tannenbaum, 1968), than they are to either the League of Women Voters (actual control) or a delivery company in the United States (see Tannenbaum, 1968, p. 65 and p. 78).

When actual and ideal curves of control were plotted separately for each level of respondent, significant differences occurred. (See Figures 2 and 3.)
Insert Figures 2 and 3 about here
 Top management saw control as distributed quite unevenly, with upper levels having the most control. They felt that ideally all levels but their own should have more control. Middle managers reported the highest total control, and saw control as distributed most equally among hierarchical levels. They felt that ideally every level, especially department heads, should have more control. Technical personnel reported the lowest total control, and they also saw control as distributed quite evenly among levels. Like the middle managers, they felt that all levels should have more control.

Control and bank effectiveness

Tannenbaum (1968) argues that organizations with more total control and with a more even distribution of control will be more effective. Table 2 shows
Insert Table 2 about here
 relationships between the effectiveness of the regional banks (as rated by experts from the national bank) and control. Total control as seen by technical personnel is significantly related to bank effectiveness ($\rho=.56$, $p<.05$), and total control as seen by middle managers is related to effectiveness in the predicted direction, but not significantly ($\rho=.30$).

The control exercised by each hierarchical level within the banks was

also related to bank effectiveness. For the technical personnel data, control exercised by middle managers (department heads and technical supervisors) was most strongly associated with bank effectiveness. For control as seen by middle managers, the control exercised by top management was related most strongly to bank effectiveness. In short, banks were more effective when technical personnel and middle managers saw the hierarchical level immediately above them as exerting more control.

Rank-order correlations between bank effectiveness and four measures of the evenness of distribution of control are shown in Table 3. None of these Insert Table 3 about here indications of the evenness of the distributions of control is related to bank effectiveness.

Thus, total control is related to bank effectiveness as Tannenbaum predicts, but banks are not more effective when control is distributed more evenly. Analysis of the control exercised by individual levels suggests that control exercised by the upper hierarchical levels is most strongly related to bank effectiveness, contrary to U. S.-based theories which emphasize that delegation to lower levels leads to organizational effectiveness.

Control in different phases of decision making

Table 4 shows relationships between bank effectiveness and control at three phases of the process of decision making on Insert Table 4 about here loan applications. (Data shown are from technical personnel only; results with data from middle managers were similar.) Neither total control nor the evenness of distribution of control was related to bank effectiveness. However, an interesting phenomenon occurred when control in each phase was examined separately for each hierarchical level. For each phase, a significant relationship was found between bank effectiveness and the control exerted by the level one would expect to be most responsible for that phase. Department heads are most responsible for determining methods of evaluation, and their control in this phase was significantly

related to bank effectiveness. Technical personnel are most responsible for project evaluation, and their control in this phase was significantly related to bank effectiveness. Finally, top management is most responsible for final approval of projects, and their control in this phase was significantly related to bank effectiveness.

In short, this analysis of control in different phases of the decision-making process indicated that banks are more effective when each level exerts more control in performing the task for which it is most responsible.

National bank control

So far we have examined the distributions of control within individual organizations. Consistent with Tannenbaum's (1968) model, we found that more effective banks had higher total control. These banks function as agents in a federal-state system of financial institutions which administer a program of loans for private enterprise. How does the control exerted by the federal government institution in these inter-organizational relations relate to the effectiveness of the state-associated institutions? (Or, if revenue-sharing ever becomes a reality in the United States, does the Brazilian experience with repass programs suggest any lessons to be learned?)

Although control-graph theory does not deal directly with the problem of inter-organizational relationships, it could be inferred from the theory that greater control by the federal government institution should be associated with greater effectiveness of the state-associated organizations. Viewed simply, greater control by the federal organization increases total control, and total control is associated with effectiveness.

Table 5 shows relationships between bank effectiveness and control exerted by the national bank. As expected, in the more effective banks, technical personnel see the national bank as having more control in their functioning as an agent in the loan program ($\rho=0.59$, $p .01$). Recall, however, that

bank effectiveness was rated by experts from the national bank, who themselves are involved in administering the loan program. Conservatively interpreted, this correlation means that people from the national bank rate more highly those regional banks in which they have more influence themselves.

To reduce the effects of this possible bias, national bank control was related to two other indicators of regional bank effectiveness: a rating by borrowers from 10 regional banks of the effectiveness of their banks, and the number of development projects in the loan program approved during the past year. Relationships between national bank control and these indicators of effectiveness were in the same direction, but weaker. The borrower rating of regional bank effectiveness was strongly associated with national bank control in the separate phases of decision making on proposed projects.

Thus, these trends indicate that in inter-organizational relations, as well as in intra-organizational decision making, greater control is associated with greater effectiveness. In the program of development loans, the more effective banks appear to be characterized by both greater control within them and greater susceptibility to control from the national bank. This finding is highly consistent with Likert's (1967) notion that more effective management systems are characterized by higher mutual influence among the organizational units involved.

CONCLUSIONS

Let us briefly summarize some highlights of this study of control in Brazilian financial institutions.

1. Contrary to the concept of the "authoritarian Latin American organization", both the actual and ideal control curves in these Brazilian banks were quite flat, indicating a relatively equal distribution of control. Differences did occur according to the level of the respondent, however, with top management seeing control distributed in a less egalitarian manner.

2. Total control was positively associated with bank effectiveness.

3. The evenness of the distribution of control was unrelated to bank effectiveness.

4. Bank effectiveness was especially related to control by the immediate superiors of those reporting on control (i. e., control by top managers for control as seen by middle managers, and control by middle managers for control as seen by technical personnel). Control by technical personnel was unrelated to bank effectiveness.

5. Bank effectiveness was especially related to the control exerted by the party most responsible in a particular phase of decision making -- department heads in determining methods, technical personnel in evaluation, and top management in approval.

6. Control by the national bank was associated with regional bank effectiveness.

It must be cautioned that these conclusions are based upon only 16 organizations, and a small number of participants at each level in each organization. Whether these differences would occur for different types of Brazilians working in different organizations on different tasks (e. g., factory workers) is a question which should be subjected to further empirical research.

Three aspects of these findings deserve special comment: the extensions of control graph theory, the distribution of the control, and the relationships between control and effectiveness.

Control graph theory. This study can be added to the increasing body of research which demonstrates the value of Tannenbaum's control graph theory. His approach was used successfully in Brazil, and the major hypothesis regarding total control and effectiveness was supported. The extension of the theory to phases in decision making led to a coherent explanation of the relationship of the distribution of control to effectiveness. Finally, the extension

of the theory to inter-organizational relations produced results consistent with the theory's non-zero-sum assumptions about control. The study of the distribution of control in inter-organizational relations appears to be a fruitful one for further work.

Distribution of control. The relatively even distribution of control found in these organizations was contrary to the authoritarian distribution of control predicted by sociological, historical, political, journalistic, and anthropological observers of Brazilian society. This incorrect prediction could mean that these observers were not so insightful in their comments on industrial organizations, the political system, or the family as the consensus among them indicates. Or alternatively, the development finance institutions could be quite different from these other Brazilian social organizations, perhaps reflecting newer directions in Brazilian society more than the traditional. The latter explanation appears more attractive, although some journalists, political scientists, or sociologists may have relied too much on higher organizational echelons for their information about the distribution of control.² Recall that the presidents and directors of the organizations in the present study saw control as distributed in a relatively authoritarian manner.

If these development finance institutions are in fact organized differently from other Brazilian organizations, it suggests that the traditional social structures in a society are not always good predictors of the modern. Moreover, the apparent success of these organizations in fostering economic development suggests that other organizations within Brazil and other developing countries might operate more effectively if control in them were distributed in a more egalitarian manner. The relationships between control and effectiveness suggest an important condition which may be necessary before this occurs, however.

Control and effectiveness. The more effective development finance institutions were characterized by greater total control in their operations. Despite the relatively even distribution of control among levels, effectiveness related more strongly to the control exercised by managers at upper hierarchical levels than to control exercised by technical personnel. The following hypothesis may help to explain these findings:

$$\text{Performance} = f(\text{control}, \text{competence}).$$

An organization is more effective when it has members who have the competence required for the task at hand, and these members have the control necessary to perform that task effectively. This circular reasoning is especially relevant to developing countries and tasks of greater uncertainty, where everyone who is asked to perform a task may not have the technical competence required for effective task performance. In the Brazilian development banks, the projects to be evaluated are complex and competence outside the banker's field of professional training is required.

Some of the people at lower levels have the necessary competence, but others do not. Therefore, on the average, control exercised by technical personnel is not associated with bank effectiveness. Those at managerial levels are more apt to have the required competence; thus, control exercised by these more competent people is more apt to be associated with bank effectiveness. Some past research (Farris, 1969; Farris and Lim, 1969) has shown that competent performance is followed by greater influence, which in the case of the banks may take the form of promotion to the managerial level.

In a developing country such as Brazil, there may be a tendency to spread resources -- especially competent people -- too thin. As a consequence, not enough control is exercised in making important decisions. To oversimplify, in such a situation, the issue is control versus no control, more than authority versus democracy. Thus, our findings show substantial associations between

bank effectiveness and total control, but not between effectiveness and evenness of the distribution of control. Control at upper levels of management is better than lack of control. When competent people are at a premium, a major challenge for managers is to place them in situations in which they can exercise more control on decisions important to the organization.³

In short, the effective development finance institution in Brazil appears to be not an "autocracy" or "democracy" but a "technocracy" -- a system organized in such a way that people are assigned to tasks for which they have the technical competence to perform. Major responsibilities for tasks (in this case, different aspects of decision making on loan applications) are clearly assigned to different levels in the organization, and the influence of each level on the task for which it is most responsible is associated with effectiveness. The resulting situation is one in which there is "rule at the top" and rule at other levels in the organization as well. And more important than simply "rule at the top of the organization" appears to be "rule at the top of the technocracy" -- the exercise of control by those who have the competence required for the tasks for which they are responsible.

FOOTNOTES

1. Research was supported by Grant 670-0122A to the Banco Nacional Desenvolvimento Economico and the Massachusetts Institute of Technology from the Ford Foundation. The authors gratefully acknowledge the comments and suggestions of Allen I. Kraut, Aroldo Rodrigues, Arnold Tannenbaum and members of the Workshop in Organizational Behavior, Graduate School of Business, University of Chicago.
2. This observation was made by the Brazilian social psychologist Aroldo Rodrigues.
3. A second challenge is to develop more people who have the competence required for the task at hand. Graduates of two-month training courses in "development banking" developed by the National Development Bank and MIT, reported that they had significantly more control in the operations of their banks as agents of the loan program than did those who did not participate in the courses.

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Rank Order Correlation Between Judged
Overall Effectiveness and

Borrower rating	.49
Number of projects	.57*
Processing speed	.20
Quality of project appraisal (Banks ranked by same judges)	.85***
Money repossessed to bank	.09
Change in effectiveness (Rated by same judges)	.32
Overall effectiveness in previous year (Banks ranked previously by 3 of the 4 judges)	.91***
Total assets	.17
Technical personnel satisfaction	.51*
Middle manager satisfaction	.52*
Employee rating of bank effectiveness	.02

* $p < .05$

*** $p < .001$

Table 1. Correlations between "overall effectiveness" and other indicators of bank performance.

Correlation Between Effectiveness
And Control as Seen by

Measure of Control	Technical Personnel	Middle Managers
Total control	.56*	.30
Top management	.36	.62**
Dept. heads	.70**	.25
Tech. supes.	.49*	-.14
Tech. personnel	.07	.02

* $p < .05$ (one-tailed test)

** $p < .01$ (one-tailed test)

Table 2. Rank order correlations between amount of control and bank effectiveness.
(N=15 banks)

Correlation Between Effectiveness
and Distribution as Seen by

Technical
Personnel

Middle
Managers

Measure of Slope

Variance from grand mean	-.07	-.05
Per cent to party with highest control	-.11	-.19
Per cent to party with lowest control	.22	.33
Per cent difference between highest and lowest groups	-.17	-.32

Table 3. Rank order correlations between evenness of distribution of control and bank effectiveness. (N= 15 banks.)

Correlation Between Effectiveness and
Control in

	Determining Methods	Evaluation	Approval
Measure of Control			
Total control	.34	.37	.13
Top management	.11	.21	.57**
Dept. heads	.54*	.22	.31
Tech. supes.	-.07	.28	.04
Tech. personnel	.12	.50*	.17
Slope			
(Variance from grand mean)	.04	-.12	.27

* $p < .05$ (one-tailed test)

** $p < .01$ (one-tailed test)

Table 4. Rank order correlations between control at different stages of decision-making and bank effectiveness. (N=15 banks; data from technical personnel)

Correlation Between Effectiveness
and National Bank Control

Measure of Effectiveness	As Agent	Determining Methods	Evaluation	Approval
National bank ranking	.59**	-.01	-.21	.19
Borrower rating	.50	.68*	.61*	.53
Number of projects	.47*	-.30	-.37	.14

* $p < .05$ (one-tailed test)

** $p < .01$ (one-tailed test)

Table 5. Rank order correlations between national bank control (as seen by technical personnel) and three measures of regional bank effectiveness.

Figure Captions

Figure 1. Curves of actual and ideal distributions of control (total sample).

Note.- In this and succeeding figures, the points marked "x" refer to control by the national bank.

Figure 2. Curves of actual distribution of control by level.

Figure 3. Curves of ideal distribution of control by level.

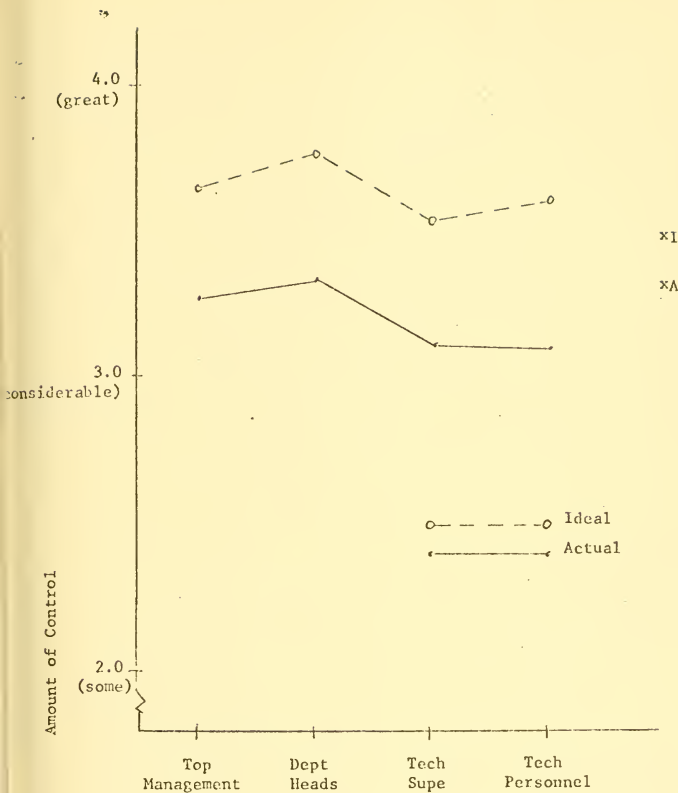


Figure 1. Curves of actual and ideal distributions of control (total sample).

Note: In this and succeeding figures, the points marked "x" refer to control by the national bank.

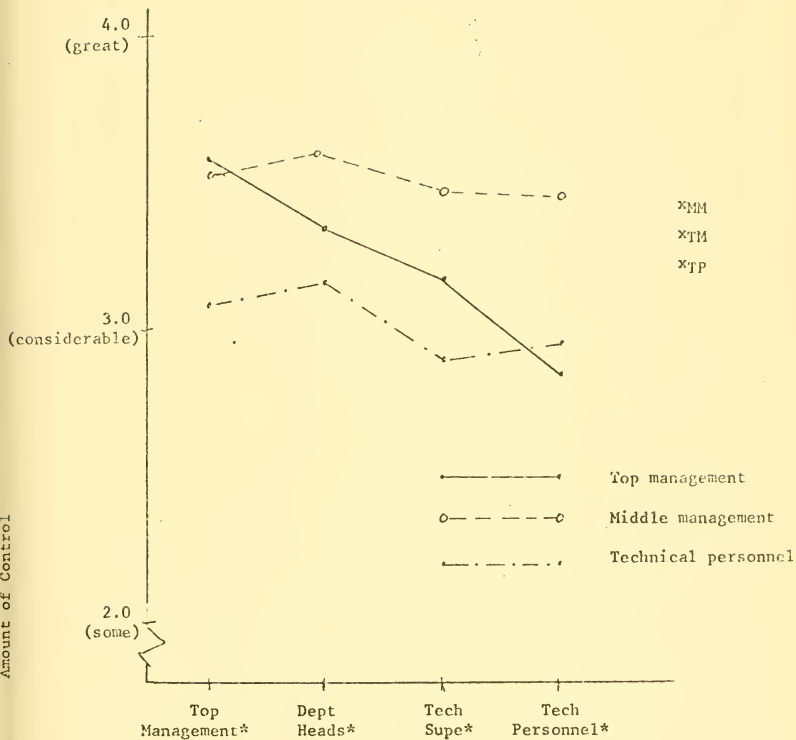


Figure 2. Curves of actual distribution of control by level.

* Difference between the three points are significant at the .01 level of confidence, by a one-way analysis of variance.

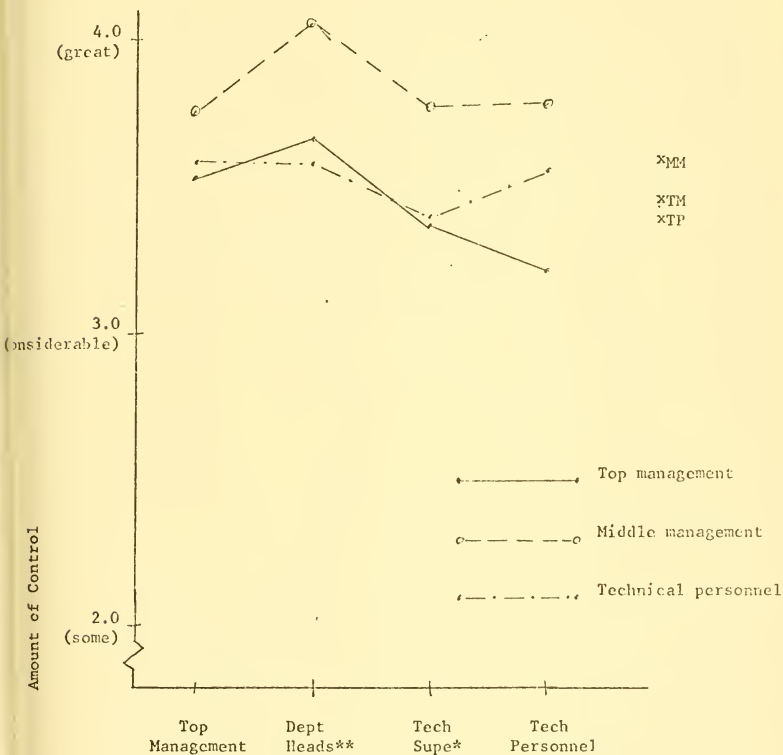


Figure 3. Curves of ideal distribution of control by level.

* Differences between the three points are significant at the .05 level of confidence, by a one-way analysis of variance.

** Differences between the three points are significant at the .01 level of confidence, by a one-way analysis of variance.



CASEWORK

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